



SAR 97-1

STRATEGIC ANALYSIS REPORT

I. TOPIC: Central Freeway Alternatives

II. INITIATED BY: Commissioner José Medina

III. INTRODUCTION: Purpose of Document

The purpose of this Strategic Analysis Report is to provide the SFCTA Board with a brief but comprehensive summary of background and analysis of transportation-related issues regarding Alternatives 1B, 3B, 8B, and 8/9 of the Central Freeway. As the name suggests, this Strategic Analysis Report, or SAR for short, is furthermore intended to highlight for the Board the strategic significance of these issues in areas of SFCTA jurisdiction, as well as to identify implications for future policy decisions by the Board in its capacity as administrator of Proposition B funds and as Congestion Management Agency (CMA) for San Francisco. Every effort was made to make this into a factual document, avoiding speculation, and leaving judgment to the reader. The document was designed to inform policy-level decision-making. Its abbreviated length (only 9 pages plus exhibits) is, therefore, an attempt to optimize its usefulness to Authority Board members. In pursuit of this goal, technical discussion has been condensed and only those facts are included which were deemed essential to outline the policy-level issues. Additional information is available from the sources cited, or by calling José Luis Moscovich, Director of Plans and Programs, at 557-6857.

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"SB 181, empowers the Board of Supervisors... to choose a locally preferred alternative for Caltrans to construct."

The Central Freeway was built in 1959 as part of a larger freeway system planned for the City, but much of that network was never built. It connects with I-80 to the east, providing access to the East Bay via the Bay Bridge, and leads to US Route 101 south, to the Peninsula. Originally, it was to connect to the Golden Gate Bridge. Before the Loma Prieta earthquake, the freeway terminated just west and north of the Civic Center area with ramps at Franklin/Gough Streets and Oak/Fell Streets.

The section of the freeway between the Fell/Oak ramps and the Franklin/Gough ramps was severely damaged by the Loma Prieta earthquake in 1989. The Franklin/Gough section was demolished in 1992 and Caltrans began seismic retrofit design for the remainder of the freeway. Following public hearings on the replacement of the freeway, the Board of Supervisors approved Resolution 541-92 in July 1992, which prohibited the construction of any new freeway ramps above ground north of Fell Street to replace the demolished sections of the Central Freeway. In 1995 the Statewide Seismic Peer Review Panel recommended that the upper deck be removed to reduce the risk of structural collapse in an earthquake. Caltrans closed the freeway between August and November 1996 and demolished the upper deck. When the much feared and expected traffic jams did not materialize during the closure, Mayor Brown requested that the Fell Street off-ramp remain closed, pending the City's selection of a preferred alternative for the replacement. In April 1997, alleging that there was pressure from increased traffic diverted to the US 101 corridor from the 19th Ave. reconstruction project, Caltrans reopened the Fell Street off-ramp.

The existing portion of the Central Freeway is not constructed to current seismic standards and requires either retrofit, reconstruction, or demolition. The current process, as outlined in SB 181, empowers the Board of Supervisors of the City and County of San Francisco to choose a locally preferred alternative for Caltrans to construct.

IV. BACKGROUND: Context - Relevant Previous Studies

The Central Freeway (Route 101) in San Francisco extends from the Route 80/101 interchange to the Hayes Valley neighborhood. The freeway is an elevated single-level steel viaduct that runs parallel to 13th Street between Route 80 and Mission Street. Until the recent demolition of the upper deck, a double-deck concrete structure ran the remaining length from Mission Street to its terminus at Oak and Fell Streets.

a. Central Freeway Citizens Advisory Task Force - Report of Recommendations

The Task Force was appointed by the Board of Supervisors to study alternatives for the Central Freeway and select a preferred alternative of traffic and transit improvements for the Central Freeway corridor, using the following criteria: a) minimize negative visual impacts; b) promote neighborhood cohesion; c) allow the maximum reclamation of freeway land for housing, open space, and neighborhood-serving commercial uses; d) allow for better management of all elements of the transportation system;

e) accommodate traffic circulation; and f) promote a healthy environment. In October 1995, the Task Force produced a Report of Recommendations selecting Alternative 8, with the option of a covered trench crossing under Page and Haight Streets or a surface boulevard on Octavia Street, as the preferred alternative. The option with the covered trench has since been dropped from consideration largely because Caltrans concluded that this option would have required acquisition of easements for the construction of retaining wall footings along the easterly right-of-way line from Page Street to Oak Street. Caltrans also determined that this option would have required extensive relocation of utilities in the below ground segments on Haight and Page Streets and that it posed unsafe stopping sight distances at the Oak and Fell Street exits. The option with Octavia Boulevard is now known as Alternative 8B.

b. DPT's Central Freeway Areawide Traffic Study

This Caltrans-funded study was prepared for the Department of Parking and Traffic by Wilbur Smith Associates in November 1995. The purpose of the study was to select the City's preferred alternative for the future freeway and related traffic network. The study was conducted in conjunction with the Task Force's *Report of Recommendations* to provide an independent evaluation of the alternatives. The study evaluated nine alternatives, analyzing traffic impacts based on the following criteria: 1) traffic volumes on the Central Freeway and its ramps; 2) PM peak hour traffic volumes on study area arterials; 3) traffic crossing Market Street and its relationship to available capacity; and 4) freeway queuing characteristics. The study also evaluated the alternatives based on visual criteria, neighborhood cohesion, impacts on other modes, environmental impacts, and construction impacts. In this study, Alternative 3 provides a single-deck crossing of Market Street, descending underground and surfacing again near Oak Street. The study recommended Alternative 3 as the preferred alternative, citing the following reasons: 1) it would provide traffic functions similar to those provided by the freeway prior to Loma Prieta but it would be much more environmentally sensitive than the current and prior elevated structure; 2) traffic increases on city streets would be minimal and confined to the corridor of the current Freeway; 3) Construction and construction impacts would be confined to the current freeway corridor; 4) the primarily below-ground roadway would present a major

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improvement to the immediate environment of the freeway corridor north of Market Street; 5) a grade-separated crossing of Market Street would be maintained, reducing traffic on streets intersecting Market Street and not interfering with MUNI service on Market and Mission Streets; 6) a safer seismic structure could be created without involving the risks of rebuilding or retrofitting while maintaining traffic by requiring total reconstruction of the concrete section of the Freeway; and 7) Caltrans and the City could support this alternative, thereby speeding implementation and increasing the potential for full funding. With the exception of 1B, the alternatives analyzed as part of this study have since either been dropped from consideration or undergone modifications.

c. **Systan's Central Freeway Evaluation Report** This report was prepared for Caltrans by Systan, Inc. in May 1997. The report discusses the Transportation Management Plan (TMP) implemented during the closure of the freeway and provides details on the public information campaign to assist commuters, as well as on the focus groups and surveys conducted. During the freeway closure, the report states that 76% of the drivers used a different freeway ramp or route, while another 11% shifted entirely to surface streets. Only 2.2% of drivers switched to transit and 2.8% no longer made the trip they previously made on the freeway. The report identifies the

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streets in the vicinity of the Central Freeway, San Jose Ave-Guerrero St., 19th Avenue -Brotherhood Way, and I-280 as common detour routes that experienced increased traffic during the closure. The report concludes that the Central Freeway public information program worked well in informing drivers in advance of plans for closing the freeway and outlining their options when it closed. Drivers experimented with the available options and found enough alternative routes so that the traffic jams expected to accompany the closing never materialized. However, according to the report, the diverted traffic brought additional congestion, delays, and potentially more accidents to city streets in the vicinity of the freeway. The report states that former freeway users affected by the closure overwhelmingly favored reconstruction of the Fell and Oak Street ramps, and that while 31.4% of the residents living in the vicinity of the freeway asked to have it torn down, more than twice that many (68.6%) wanted to see it restored in one form or another.

d. Draft Environmental Assessment.

Caltrans prepared this report in April 1997 pursuant to 42 U.S.C.4332 (2)c. (National Environmental Protection Act - NEPA). The report identified Alternatives 1A, 1B, 8B, 10,

and a "no project" alternative as possible alternatives for further discussion, and it dropped Alternatives 3, 8, 8A, and 9 from consideration. Alternatives 3, 8, and 8A were dropped from consideration because of high cost and property acquisition requirements. Alternative 9 was also dropped from consideration because of property acquisition requirements and other engineering considerations. (Please note: a full retrofit project had been designed and planned for construction by Caltrans, but was shelved in 1992 when the Board of Supervisors adopted Resolution 541-92). The alternatives chosen for inclusion in the *Draft Environmental Assessment* were based on the alternatives presented at a November 20, 1996 public meeting. Alternative 10 was included at the request of the City after the public meeting. The report evaluated anecdotally each of the alternatives in the areas of air quality, noise, visual impacts, land use, and economic impacts. Traffic impacts and travel times were also evaluated at an order-of-magnitude level, including capacity analyses on the freeway and on city streets at selected intersections, and some queuing analysis. The capacity analysis was done considering individual intersections, not a comprehensive network, and there was no iterative analysis to balance traffic. As a result of comments received regarding the Draft Environmental Analysis Report, Caltrans intends to incorporate into the final version an analysis of Alternatives 3B-1, 3B-2, and 8/9. Caltrans staff prepared a review of this alternative and provided details to the Authority. This review was performed at a more general level than for the other alternatives. More information on this is included in the discussion of Alternatives 3B-1, 3B-2, 8/9 and in the section on methodology.

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calculated reliably at this time to provide meaningful information to the policy-making process, and are therefore not included here, and we point out the strengths and shortcomings of other data items, suggesting the most appropriate context for using them for decision-making.

A.1 Performance Measures

The Authority's analysis focused on the performance of the different alternatives vis-à-vis three major transportation system measures: **traffic handling capabilities, pedestrian and bicycle safety, and transit service impacts.** In addition, we looked at **construction timetable and cost** as two important factors to be used in decision making. A potentially very significant factor, the likely availability of funds from the sales of excess property in the freeway's right-of-way, is included here thanks to the preliminary estimates just developed by the

office of the Budget Analyst. Other impacts, such as air quality, historic, property values, etc., have been addressed in other studies and were clearly beyond the scope of this SAR as requested by the Authority Board. The travel time differences between alternatives, estimated in the studies by Caltrans, are so small that they cannot be supported by the relatively inaccurate calculation methods used. (For example travel speeds were in various instances assumed to range from 5 to 9 mph on city streets). This renders forecast travel time figures meaningless for decision-making at this level. This is further discussed in section D.

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A.2. Study Area / Data Used: Though it is generally accepted that the area of influence of the Central Freeway extends as far as 9th street in SOMA and McAllister St. to the north, the SAR's more detailed intersection analyses were concentrated in the area closer to the freeway ramps proposed under each alternative, where the greatest impacts would be located. Figure 1 provides an indication of the geographic reach of the study area. The two main data sources for this SAR's traffic analyses were Caltrans and the Department of Parking and Traffic. It is essential to note that the traffic analyses were done by Caltrans at a fairly general level, without the benefit of an iterative process for balancing intersections and optimizing the whole transportation network. The Authority's view is that this kind of analysis is indeed acceptable for a planning level study. While it is always possible to devote more effort to detailed traffic analysis and modeling, it must be clearly understood that, given the numerous routing options available to drivers on San Francisco's dense street grid, it would be extremely difficult to

V. STRATEGIC ANALYSIS

A. Introduction

Our strategic analysis is intended to raise the level of comfort about the comparability of the information available for all alternatives, and to provide the Authority Board with a road map for decision making. In order to achieve this, we have critically reviewed and commented on the methods and data used by Caltrans and the Department of Parking and Traffic in evaluating and making recommendations about the different alternatives. we have provided supplemental information on a couple of alternatives that had not been studied by Caltrans at the same level of detail as the others, and we have tried to provide perspective on the relevance of the different pieces of data to the final choice of a locally preferred alternative. In the process we show that some data items cannot be

accurately predict how traffic would divert even using the most sophisticated modeling tools. More important to the discussion at hand are the relative differences in the performance of the different alternatives.

Construction cost and completion time data for all alternatives comes from Caltrans District 4. The SAR provided a reasonableness check on all figures and introduced a few adjustments. This topic is further discussed in sections V.E. and VI., below.

A.3 Analysis Process: The Authority's analysis process included an evaluation of the methods and results arrived at by Caltrans and DPT, and the necessary calculations to provide comparisons for Alternative 8/9, which had not been previously analyzed at the same level as the others. In addition, we made the necessary calculations to address the differences between Alternatives 3B-1 and 3B-2. The calculation of intersection Levels of Service (LOS) was completed using volume to capacity (v/c) ratios taking into account the summation of the largest volumes for conflicting movements. This simplified method, which is on a par with the one used by Caltrans and DPT, is adequate for a discussion of the relative differences between alternatives. Our analysis relied largely on actual data (i.e., traffic counts) as opposed to projections. Our approach assumed, consistent with City policy, that the main goal of the traffic analysis was to determine each alternative's ability to serve the *existing* traffic demand, and not necessarily to add new freeway capacity. It is well universally accepted in the traffic engineering profession that any extra capacity added will immediately be filled by the latent demand for automobile travel in the city. It is worth noting that our analysis assumptions are conservative. For example we used intersection capacities of 1,500 vehicles/hr., rather than the 1,800 or 1,900 that are usual in suburban locations, as a way to acknowledge the influence of bicycle and pedestrian conflicts, as well as frequent presence of transit vehicles in mixed traffic, which have the net effect of reducing vehicular capacity.

Transit service impacts were calculated using daily ridership statistics by route (from MUNI). We made a general assumption that the p.m. peak hour would carry 20 % of the total daily ridership for routes that operate all day, and 30% of total ridership for routes that operate only on a.m. and p.m. peak periods.

B. Alternatives

Figures 1 through 4 illustrate the four alternatives still being considered for the Central Freeway. (There are essentially four alternatives: 1B, 3B, 8B and 8/9, though we have considered two variations of alternative 3B: 4-

lane and 6-lane boulevard). The descriptions below provide further details as well as a critical assessment (functional analysis) of the most significant features of each alternative relative to some key performance measures. Essentially, these four alternatives represent two different philosophies for addressing the travel demand needs in this corridor. One philosophy, espoused by Alternatives 1B and 3B, relies on a grade-separated crossing of Market Street. By relying on the bridge across Market, these alternatives provide a predictable travel path for drivers, and they also concentrate neighborhood traffic

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impacts at or near the gateway where the bridge touches down. At the other end of the spectrum, Alternative 8/9 aims at dispersing traffic impacts so that no single geographic area carries the bulk of the traffic impacts. It does so by adding on and off ramps, so that the freeway fans out into the urban fabric, rather than terminating in a single main gateway. The main objective of traffic dispersion: to lessen the impacts of freeway traffic crossing Market Street, are accomplished. The benefits of this alternative in terms of neighborhood impacts reduction are limited by the fact that Fell and Oak Streets are still, under all alternatives, the most logical choice for east/west travel from/to the Central Freeway area. Alternative 8B brings the freeway to the ground at Market Street, concentrating the traffic impacts at the intersection of Octavia and Market without the benefits of a grade-separated crossing of Market Street.

Table 1 provides an overview of the main characteristics and performance evaluation of the alternatives. The following sections describe the alternatives and provide a functional assessment of each one.

Alternative 1B (Prop. H): Developed by Caltrans, this alternative would retrofit and widen the existing lower deck of the Central Freeway, providing a 4-lane single deck structure from Mission Street to Oak and Fell Streets. From the intersection of Page and Octavia Streets to Oak and Fell Streets ramps, the structure would be replaced rather than retrofitted. The deck of the four-lane structure would be 23.77 meters (80') wide. It would be the same height as the existing 2-lane single deck structure. This alternative would not require any additional right of way acquisition. At approximately \$67.6 million, this is the most expensive alternative of the four analyzed. It would also take the longest time (58 months) to complete (about 13 months longer than the quickest alternative). Completion times are lengthened, among other factors, by the nature of the work: a retrofit of an existing structure takes longer than building a new one. Taking into account

the \$17.5 million in available (federal) Emergency Relief funds, and the potential \$4.6 million in land sales revenue, this alternative has the largest funding shortfall: \$45.5 million. **Functional Analysis:** This alternative would restore the circulation pattern that existed prior to the demolition of the upper deck and of the Oak Street on-ramp. This alternative assumes that freeway-related traffic from/to the north section of town (which was served by the Franklin/Gough ramps before Loma Prieta) would use the Oak/Fell ramps or be diverted to ramps in the South of Market Area (SOMA). As a result, there would be a return to comparable freeway and neighborhood congestion conditions to what existed before the demolition of the upper deck. In the a.m. peak, the freeway would be the bottleneck (at the junction with US 101 southbound). In the p.m. peak hour the city streets would become the bottleneck, and traffic would back up on the Fell Street off-ramp. Freeway-bound traffic from/to the north section of town would create impacts in the neighborhood around the Oak/Fell ramps and (to a much smaller degree) around other ramps in SOMA. Our p.m. peak hour analysis indicates that this alternative would result in an average level of service (LOS) of C in the key corridors in the study area (see figure 5). Because of the elevated structure, this alternative would concentrate congestion on the freeway, rather than dispersing it on city streets. This alternative has the lowest impacts to transit service, and the lowest pedestrian and bicycle safety impacts.

Alternative 3B-1: Developed by Supervisor Michael Yaki, this alternative would provide a new four-lane single deck structure from Mission Street crossing over Market Street and touch down at Haight Street with a signalized four-lane on and off-ramp which would serve as the main gateway to the Central Freeway. North of Haight Street there will be a four-lane surface boulevard parallel to the existing Octavia Street to provide access to and from the Oak, Fell, Gough and Franklin Street corridors. This alternative would not require any additional right of way, it would cost approximately \$55.3 million and it would require 50 months to complete. Accounting for the \$17.5 million in Emergency Relief dollars available, and for a potential \$9.6 million in land sale revenues, this alternative has a \$28.2 million funding shortfall. **Functional Analysis:** Caltrans provided only anecdotal analysis of this alternative in the *Draft Environmental Assessment*. Since 3B shares many functional characteristics with 1B (and to a lesser degree with 8B), we were able to compile a comparable level of information for 3B after performing limited additional technical analysis. By providing a 4-lane bridge over Market Street, Alt. 3B would lead to very similar traffic circulation patterns as Alt. 1B. Since the origin/destination pattern is assumed to be the same under

all alternatives, an amount of freeway-related traffic from/to the north section of the City similar to that using the Fell/Oak ramps in Alt. 1B, would use the Octavia gateway in Alt. 3B. Neighborhood traffic conditions would be comparable, but the brunt of the impacts would shift one block west to Octavia/Fell and Octavia/Oak.

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Locating the main freeway gateway on Octavia would provide more direct access/egress for freeway-related traffic heading to/from the north, cutting down on the number of turns necessary for vehicles to wind their way through Hayes Valley and around Laguna/Oak/Fell to the freeway. A.M. peak circulation would be comparable to that expected with Alt. 1B because the key bottleneck is still the connector ramp from the Central Freeway to southbound US 101. Our p.m. peak hour analysis indicates that this alternative would result in an average level of service of D in the key corridors in the study area (see figure 6). It would also have low transit service impacts because of the grade-separated crossing of Market Street, although it would affect more transit routes than 1B because of the grade crossings at Haight and Hayes Streets.

Alternative 3B-2: This is a variation of 3B with a six-lane surface boulevard parallel to the existing Octavia Street to provide access to and from the Oak, Fell, and Gough Street traffic corridors. This alternative would not require any additional right of way acquisition, it would cost \$57.9 million and it would require 54 months to complete. With \$17.5 million in Emergency Relief funds and a potential \$9.6 million in land sales, this alternative has a \$30.8 million funding shortfall.

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Functional Analysis: The principal difference between Alternatives 3B-2 and 3B-1 is that Alt. 3B-2 provides 3 lanes northbound on Octavia from just below Oak to Fell, allowing the intersections of Octavia/Oak and Octavia/Fell to better handle the high volume of traffic heading westbound on Fell. Providing 3 northbound lanes on Octavia from Haight to Oak would not make much of a difference since that part of Octavia is not the main constraint for freeway-related traffic in this corridor. There would be no significant traffic handling advantage to providing 3 lanes (as opposed to 2) southbound on Octavia or on the initial block of the freeway ramp itself, because southbound traffic must merge into 2 lanes quickly after entering the freeway at Octavia/Haight.

Alternative 8B: Developed by the Central Freeway Citizens' Advisory Task Force in conjunction with Caltrans, this alternative would provide a single deck 4-lane facility from Mission Street over the existing right of way to the south side of Market Street near the intersection of McCoppin Street and Elgin Park. The freeway would touch down at a signalized intersection at Market Street, serving as the main gateway to the Central Freeway. The new single deck would be 23.77 meters (80') wide. There would be no modifications to any of the ramps south of Market. North of Market, the right of way now occupied by the existing freeway structure would become a 4-lane boulevard, consisting of two northbound and two southbound lanes from the intersection Market and Octavia Streets to Fell Street. The existing two north-south lanes on Octavia Street would become one-way northbound traffic lanes from the intersection of Octavia and Market Streets to Oak Street, intended for local

"The freeway would touch down at a signalized intersection at Market Street..."

traffic use. A narrow island would separate the two lane local roadway from the four-lane roadway. This alternative would not require any additional right of way, it would cost \$48.1 million and would require 45 months to complete. Considering the available \$17.5 million in Emergency Relief funds, and potential land sales of \$10.5 million, this alternative would have a \$20.1 million funding shortfall.

Functional Analysis: This alternative, which was studied by Caltrans as part of the *Draft Environmental Assessment*, would have a noticeably different effect on traffic circulation than Alts. 1B and 3B. Our evaluation of the Caltrans analysis of Alt. 8B introduced an important adjustment: the Caltrans calculations used a capacity of 2500 veh./hr for the on/off ramp at Octavia and Market. We believe that the figure should be 1500 veh./hr plus 200 veh./hr for right turns. We proposed so because we believe that the demand for east-west traffic flow on Market Street, a General Plan-designated Transit Preferential Street with a significant amount of through traffic, needs to be balanced with the need for freeway-related traffic to cross Market Street. It would be inconsistent with City policy to maximize freeway capacity at the expense of Market Street. This would effectively reduce the number of vehicles that could exit/enter the freeway at Octavia and Market compared to the Fell/Oak ramps in Alt. 1B, and it would result in a noticeable increase in surface street traffic as freeway-related traffic uses other south of Market ramps to reach the Oak/Fell corridor. This would have some dispersal effects, separating the traffic that's headed north from the traffic that's headed west *before* it gets to the Hayes Valley area. This dispersion of freeway-related traffic would result in a reduction in localized neighborhood impacts compared to using the Oak/Fell ramps in Alt. 1B; however, there would still be high volumes on the Oak/Fell corridor. In the a.m.

peak there would also be some traffic dispersion (e.g. shifting to South Van Ness and 10th Street on-ramps), but not a significant amount because the key bottleneck in the a.m. for outbound traffic is on the freeway itself (the connector to southbound US 101) not on the surface streets leading to the freeway. Our analysis indicates that this alternative would result in an average level of service of D in the key corridors in the study area (see Figure 7). Please note that for LOS calculations the boulevard is assumed to have 5 lanes, as described for Alt. 3B-2. Impacts to transit service would be higher than for the previous alternatives. This alternative would have the highest bicycle impacts (because it concentrates conflicts at the Market Street intersection, and higher pedestrian impacts than Alternatives 1B and 3B.

Alternative 8/9: Developed by the Association to Simplify Traffic and Abate Congestion (ASTAC), a neighborhood group, this alternative would end the northbound freeway mainline at Mission Street with a signalized three-lane off-ramp and begin the southbound mainline at Valencia Street with a two-lane signalized on-ramp. A new off-ramp at South Van Ness Avenue and a new on-ramp along Otis Street would be constructed. A new South Octavia Street between Market Street and Mission Street and a new Octavia Boulevard from Market Street to Fell Street would be developed. The new South Van Ness off-ramp would necessitate the taking of a traffic lane and a parking lane along 13th Street. The cost of this alternative is \$44.9 million and it would require 48 months to complete. Taking into account the \$17.5 million in Emergency Relief funds and an estimated \$10.5 million in land sales revenue, this alternative has the smallest funding shortfall: \$16.9 million. The variation of Alt. 8/9 originally analyzed by Caltrans included a new South Franklin Street allowing Mission Street off-ramp traffic to connect to Franklin Street. Caltrans estimated that the new South Franklin Street from Otis Street to Market Street would cost an additional \$10 million for property acquisition, demolition, and construction of the new street. ASTAC made it clear during interviews conducted during the development of this SAR, that they do not support the construction of a South Franklin street. Our definition of 8B and our analysis reflect their latest proposal, without a South Franklin Street.

Functional Analysis: This alternative was analyzed only anecdotally by Caltrans. As requested by Commissioner Medina, Authority staff undertook the traffic analysis of this alternative to bring it to par with the level of information available for the others. Our analysis found that alternative 8/9 is the most different functionally from Alt. 1B because instead of concentrating freeway-traffic in one corridor (Oak/Fell Streets), it is designed to

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disperse traffic. Under Alt. 8/9 freeway-related traffic spends more time on city streets because all the ramps end south of Market Street. In the p.m. peak hour, there would be a noticeable increase in traffic volumes on routes such as Mission-Otis-Gough-Market-Franklin and 9th-Hayes-Gough-Fell as freeway-related traffic shifts to other south of Market ramps and then takes surface streets to reach the Oak/Fell corridor or other north or westbound routes. The new 13th/South Van Ness off ramp would pull some of the northbound traffic and route it to Van Ness or Franklin. Neighborhood impacts would be more widespread because traffic is more dispersed.

Alternative 8/9 would offer some advantages for a.m. peak traffic heading to the freeway because it would provide an additional on-ramp at Gough/Otis Street. This ramp would provide some storage capacity, taking vehicles off the surface streets and it would help disperse traffic by providing another access point to the freeway. However, surface traffic conditions are not critical in the a.m. peak hour, since the bottleneck for outbound traffic is the freeway connector ramp to southbound US 101. Our analysis indicates that this alternative would result in an average level of service of between D and E in the key corridors in the study area. (see Figure 8). Please note that for LOS calculations the boulevard is assumed to have 5 lanes, as described for Alt. 3B-2. This alternative would also have the highest transit service impacts. This alternative would have higher pedestrian and bicycle impacts than 1B and 3B, but probably lower than 8B.

C. Matrix of Alternatives/Performance Measures

Table 1 displays comparable information for all alternatives analyzed as part of this SAR. Key performance measures include construction cost and timing, an estimate of the funding shortfall that will need to be addressed in order to implement each alternative, a systems-level evaluation of traffic handling capabilities (expressed in terms of an overall average level of service for the study area) and a qualitative evaluation of transit impacts and pedestrian and bicycle safety under the different alternatives. Section E, below, provides a framework for trade off analyses and interpretation of the technical data gathered about all alternatives.

D. Funding Prospects

In the wake of the Loma Prieta earthquake, Congress authorized \$1 billion in federal Emergency Relief funds for transportation projects in northern California. Of that amount, Congress appropriated \$40 million immediately for the Central Freeway project. Of those, \$17.5 remain after Caltrans

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used \$22.5 to demolish the Franklin and Gough ramps and the upper deck, for seismic stabilization of the remaining structure, and for engineering studies for the replacement facility. The remaining \$45 million earmarked for the Central Freeway were never appropriated, pending the selection of a locally preferred alternative. Appropriation of additional funds by Congress is possible, but not before the city selects a locally preferred alternative.

Recently, the Caltrans District 4 director indicated that Caltrans had included the Central Freeway project in the proposed list of projects for the State Highway Operations and Protection Program (SHOPP). This program is mostly focused on safety and pavement and bridge rehabilitation projects. There is high demand for SHOPP funds and this is a statewide program. If successful, the Central Freeway would probably claim more than half of the funds likely to be available to the Bay Area in the current programming cycle. The recent passage of SB45, signed into law by the governor last week, changes the state transportation funding process and introduces more questions about the availability of state funding for this project. Those questions will have to be addressed in the next month, as the region and the state prepare to respond to the changes introduced by SB 45.

The Central Freeway project would be eligible for other funding sources such as state funds programmed through the State Transportation Improvement Program (STIP) and federal Surface Transportation Program (STP) funds. Funding the Central Freeway with these sources would involve a direct tradeoff with other San Francisco transit, bicycle, pedestrian, and roadway projects. Estimated 1998 STIP funds available as San Francisco's county share (the so-called "county minimum") are on the order of \$60 to \$75 million every two years. These will be Fiscal Year 2003/04 funds. The amount of federal Surface Transportation Act (STP) funds is unknown pending reauthorization of ISTEA legislation, but past San Francisco amounts have been on the order of \$12 million every two years.

The Central Freeway was unfortunately not contemplated at the time when the Proposition B Expenditure Plan was put together. As a result, there is no construction funding available from Prop. B for this project. Some arterial improvements such as traffic signals may be fundable through Prop. B.

The Board of Supervisors' Budget Analyst has prepared estimates of potential revenues from the sales of Central Freeway right of way. Use of the revenues for the Central Freeway would require special state legislation like SB 181, which allowed the City to use revenues from the sale of Embarcadero Freeway parcels to pay for the new Embarcadero Roadway. The contribution of this funding

source could be substantial and it is discussed separately for each alternative.

E. Trade-Off Analysis/ How to Interpret the Data

Traffic Handling Capacity: Although the freeway can at times act as a bottleneck, the traffic-handling capacity of all these alternatives is largely determined by the capacity of the street network. All alternatives can handle the traffic, but they do it with different localized impacts. Alternatives 1B and 3B create increased congestion around Oak/Fell/Laguna, and at Oak/Fell/Octavia respectively. Alternative 8B increases impacts at Octavia/Market and Octavia/Oak/Fell. During the p.m. peak hour. During the p.m. peak hour Alternative 8/9 fills in the available capacity at most key intersections in the study area. Table 2 provides a look at level of service for all key corridors under the different alternatives, and provides a system-wide average as well. The corridor LOS is determined largely by the LOS at key intersections along each corridor.

Table 3 shows the car-handling capacity of all alternatives, expressed in vehicles per hour for the p.m. peak hour (the worst case). This table is included to provide some perspective for the interpretation of system level of service information in Table 2. Table 2 shows what appears to be an intuitive progression from Alt. 1B (best) to Alt. 8/9 (worst) in terms of average street level of service. While this interpretation is correct, it must be born in mind that the difference in capacity between these two alternatives is only 560 cars, or 15% of the total demand that we are trying to meet in the p.m. peak hour. As a reference, a single lane of an arterial like Van Ness or Gough can handle between 750 and 900 cars per hour. It must also be understood that the calculation of level of service is intended to provide a hierarchy or ranking of alternatives based of intersection performance. There is enough variation in daily traffic volumes and conditions on city streets and on the freeway to affect levels of service up or down. The estimates provided in Table 2 are within an error margin of one level of service (i.e., what our analysis shows as LOS C could be B or D, but it is unlikely that it would be A or E). Finally, it's very important to keep in mind that the impacts described in Table 1 apply to the p.m. peak hour only. The system performs much better under all alternatives during off-peak hours.

"All alternatives can handle the traffic, but they do it with different localized impacts."

"...the difference in capacity between these two alternatives is only 560 cars, or 15% of the total demand..."

Transit Impacts: The information provided about transit service impacts must be regarded as a qualitative indication of potential impacts, not as an absolute benchmark. Generally, as system performance (i.e. LOS) declines, transit service would be affected since it operates in worse traffic. Impacts to individual routes will depend on actual service schedules and frequency.

Pedestrian and Bicycle Safety: Pedestrian and bicycle impacts were addressed qualitatively. The assumption is that increased traffic on city streets would result in worsening of pedestrian and bicycle conflicts. It may be possible to ameliorate pedestrian and bicycle conflicts at key intersections, through the use of devices such as all-red signal phases, but the general level of analysis possible at this planning stage does not permit an accurate evaluation of these detailed operating options. In fact some of those are likely to be resolved only after the new facility is in place.

Construction Costs: Construction costs include engineering, demolition, construction and traffic system management (TSM) costs. Note that traffic management measures such as Traffic Control Officers are assumed to be funded only during the time that the project is being constructed. The LOS results shown assume no traffic management measures beyond the construction period. We believe that the figures presented are reasonable, and we have introduced relatively minor adjustments to the Caltrans estimates where warranted. However, planning level estimates presuppose a fairly generous margin of error (15 to 20% is not unusual), which can only be narrowed down through detailed design and engineering. For example, we believe there may be higher costs associated with keeping the freeway open during retrofit and expansion (in Alt. 1B), beyond the Caltrans estimates. It is also possible that value engineering of Alternative 8/9 may result in some cost reductions through better construction staging.

Completion Times: Figures for project completion times come from Caltrans District 4 and are reflected exactly as provided. It must be noted that in all cases about half of the time (between 24 and 28 months depending on the alternative) is accounted for by design, engineering and contractor selection tasks performed by Caltrans staff. Given the recent PCEG decision by the California Supreme Court, which prevents Caltrans from contracting out work that can be performed by union engineers, Caltrans would be hard pressed to deliver this project any sooner than the time frames they have estimated, and it is likely that construction times may stretch even further as a result of understaffing in Caltrans

"As a turn-key contract, the Authority estimates that this project could be delivered in about half the time..."

District 4 and additional pressures brought on Caltrans by the recent passage of SB 45. As a turn-key contract, the Authority estimates that this project could be delivered in a much shorter time, once a locally preferred alternative was chosen. Such an approach would be eminently feasible, particularly if no state dollars are involved. Total delivery estimates range from 48 to 58 months depending on the alternative. This raises the question as to whether the City should consider locally managing the project, which would also likely result in some overall cost savings. A precedent for this approach is the City's management of the construction of the Embarcadero Roadway after the Embarcadero Freeway was demolished.

The Issue of Travel Time: A distinction must be made between the analysis of conditions during peak and off-peak periods. During off-peak hours, when congestion is at its lowest levels both on the freeways and on city streets, it is easy to conclude that an alternative like 1B would perform best, bringing the traveler to Fell Street, or getting the traveler to US 101 or I-80 in the shortest time. Alternative 3B would be the next best, because of the grade-separated crossing of Market Street. However, the analysis must be done to accommodate the p.m. peak hour, which is the one that presents the greatest operating challenge. One of the main reasons is that the capacity of the freeway to deliver traffic onto Fell street is limited by the capacity of the intersection at Laguna Street, where the freeway meets Fell Street. In the p.m. peak the freeway itself acts as a parking lot for westbound traffic waiting to get onto Fell Street (the Main and Howard off-ramp of the old Embarcadero freeway used to behave this way, as well). Meanwhile, there is unused capacity on the Mission Street and 9th Street off-ramps: drivers headed for Fell Street used to queue up on the freeway rather than drive through Hayes Valley to Fell Street, even though travel times on city streets are, under these conditions, likely to be very comparable. The other reason is that traffic management enhancements, such as the double left turn lane at Van Ness and Hayes, introduced by the Department of Parking and Traffic on a number of key arterials last year during the closure of the freeway, have significantly improved traffic flow in key corridors like 9th street and Van Ness Avenue.

VI. SUMMARY

It is apparent from the analysis performed in this SAR that, exclusively from a transportation and circulation perspective, the Central Freeway question boils down to a consideration of construction costs versus transportation system performance.

The SAR provides a clear indication of the relative size of the traffic benefits of each of the alternatives relative to their cost, in the context of the estimated funding shortfall.

The SAR also points to the main impacts to transit service and pedestrian/bicycle safety, though those factors are dealt with in a more qualitative fashion, as warranted by the reliability of the limited data available.

The SAR, therefore, points out the range of costs and the range of performance outcomes for the different alternatives. The challenge for policy-making is to decide whether the improvement in traffic performance provided

by the more expensive alternatives is worth the extra cost.

"The challenge for policy-making is to decide whether the improvement in traffic performance provided by the more expensive alternatives is worth the extra cost."

The SAR also raises the issue of the protracted completion time estimates provided by Caltrans, which would result in another 4 to 5 years before the project is completed (regardless of

the alternative chosen), and it also points out the need for the City to consider the possibility of locally managing the project, which could cut delivery time substantially.

VII. BIBLIOGRAPHY/SOURCES CONSULTED

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VIII. AUTHORITY STAFF CREDITS

Maria Lombardo was responsible for all traffic analyses and graphics, with assistance from John Wilson, of The Wilson Engineering Company. David Chan contributed the background sections, was responsible for the research on costs and conducted the majority of the interviews with interested parties. Our interns Joe Castiglione and Andrew Koehly provided invaluable help with maps and LOS calculations.

TABLE 1

	ALTERNATIVES				
	1B	3B-1 (4 Lanes)	3B-2 (6 Lanes)	8B	8/9
Developed By	Caltrans	Supervisor Yaki	Supervisor Yaki	Task Force	ASTAC
Total Cost (1)	\$67.6 million	\$55.3 million	\$57.9 million	\$48.1 million	\$44.9 million
Land Sales Revenues (2)	\$4.6 million	\$9.6 million	\$9.6 million	\$10.5 million	\$10.5 million
Funding Gap (3)	\$45.5 million	\$28.2 million	\$30.8 million	\$20.1 million	\$16.9 million
Estimated Time for Completion (4)	58 months	50 months	54 months	45 months	48 months
New Octavia Boulevard (5)	No	Haight to Fell	Haight to Fell	Market to Fell	Valencia to Fell
Bridge Over Market	Yes	Yes	Yes	No	No
Pedestrian/Bicycle Safety Impact (6)	Low	Low	Low	Med	High
Transit Impact (7)	Low	Low	Low	Med	Med/High
Traffic Handling Ability (8)	C	D	C/D	D	D/E

(1) Cost based on figures developed by Caltrans.

(2) Land sales revenues based on estimates prepared by the Office of the Budget Analyst (modified by the Authority).

(3) Obtained by subtracting the available \$17.5 million in Emergency Relief funds and the estimated land sales revenues from the total cost.

(4) Includes design, engineering, contractor selection and construction time. Estimates are from Caltrans District 4.

(5) Alternatives 8B and 8/9 assume a 4-lane boulevard with left turn bays (i.e. : 5 lanes at intersections).

(6) Qualitative measure, based on DPT's high accident intersection data and expected traffic increases for each alternative.

(7) P. M. Peak ridership figures derived by the Authority from MUNI daily route ridership statistics.

(8) Areawide (average) level of service, based on intersection LOS along key corridors in the study area.

Table 2

P.M. Peak Hour Level of Service (LOS) Along Key Corridors¹

Corridor ²	From/To	Alt. 1B	Alt. 3B	Alt. 8B	Alt. 8/9
Hayes	Gough to Larkin	C	D	D	D/E
Fell	Laguna to Polk/Market	D	C	C/D	C/D
Oak	Laguna to Franklin	C	D	D	D
Market	Laguna to Larkin/9 th	C	C	D	E
Duboce	Market to Otis	D	D	D	D
Octavia	Fell to Market	C	D/E	D/E	D/E
Gough	Hayes to Mission	C	D	D	D/E
Franklin	Hayes to Market	C	C	C	C/D
Van Ness	Hayes to Division	C	D	D	E
	Average LOS	C	C/D ³	D ³	D/E ³
		C	C ⁴	D ⁴	D/E ⁴

Table 3

P.M. Peak Hour Central Freeway Off-Ramp Volumes⁵

	Alt. 1B	Alt. 3B	Alt. 8B	Alt. 8/9
Fell/Oak, Octavia, or Market off-ramp	2,700	2,050	1,700	
Mission off-ramp	1,130	1,370	1,370	1,700
13 th St/So. Van Ness off-ramp	n/a	n/a	n/a	1,600
Total⁶	3,830	3,420	3,070	3,300

¹ Level of Service (LOS) is a measure of how well traffic flows. Values range from A(best - free flow) to F (worst - gridlock).

² LOS was calculated using a planning level approach based on intersection capacity, without the benefit of an iterative process for balancing intersections or optimizing the entire network.

³ Assumes 6-lane Octavia Boulevard

⁴ Assumes 4-lane Octavia Boulevard

⁵ Assumes demand is same for all alternatives (pre-demolition levels)

⁶ Using Alt. 1B as the baseline for comparison, all other alternatives would involve some traffic diversion to ramps beyond the study area. For example 9th street can absorb up to 400 additional cars before reaching pre-earthquake traffic levels.

Appendix I

CHRONOLOGY OF KEY EVENTS

- 1959 Caltrans builds Central Freeway.
- 10/89 Loma Prieta Earthquake damages Central Freeway.
- 1990 Caltrans provides interim seismic support on concrete portion from Mission Street to Fell Street.
- 9/91 State Senate passes SB 181, prohibiting Caltrans from repairing or replacing US 101 unless the City of San Francisco approves a selected alternative.
- 2/92 Caltrans demolishes Franklin/Gough ramps.
- 7/92 Board of Supervisors (BOS) adopts Resolution 541-92, calling for no new ramps above ground north of Fell Street to replace the demolished sections of the Central Freeway.
- 1/94 BOS adopts Resolution 9-94, requesting the Mayor to urge Caltrans to delay the retrofit process of the Central Freeway until alternatives are studied.
- 2/94 BOS appoints Hayes Valley/Western Addition Transportation Task Force.
- 6/94 Task Force votes to reject Caltrans' retrofit plan.
- 12/94 BOS changes Task Force's name to the Central Freeway Citizens' Advisory Task Force and expands representation.
- 3/95 Caltrans sponsors alternatives definition study and requests Task Force to select a preferred alternative in six months.
- 10/95 Central Freeway Citizens' Advisory Task Force chooses Alternative 8⁽¹⁾ as the preferred alternative.
- 10/95 BOS adopts Resolution 869-95, urging Caltrans to advance Alternative 3⁽²⁾, Alternative 8, and the retrofit alternative⁽³⁾ to the environmental review stage.
- 11/95 Sponsored by Caltrans, Wilbur Smith Associates publishes Central Freeway Areawide Traffic Study for the Department of Parking and Traffic to evaluate traffic conditions and select a preferred alternative. The study selects Alternative 3 as the preferred alternative.
- 8/96 Caltrans closes Fell/Oak Streets ramps for demolition of upper deck.
- 12/96 Caltrans completes demolition of the upper deck of the Fell/Oak Streets ramps.
- 4/97 Caltrans reopens Fell Street off ramp. Freeway bound traffic must use Duboce/South Van Ness or other on ramps.
- 4/97 Caltrans publishes Environmental Assessment, including Alternatives 1A, 1B, 8B, 10, and a No-Project Alternative.
- 4/97 Association to Simplify Traffic and Abate Congestion (ASTAC) introduces Alternative 8/9⁽⁴⁾ at Central Freeway public hearing.
- 5/97 Systan, Inc. publishes Central Freeway Evaluation Report, describing effects of temporary closure for demolition of upper deck.
- 8/97 Transportation Authority Board requests SAR on Central Freeway alternatives.
- 11/97 San Francisco residents vote on Proposition H (Shall the City authorize Caltrans to rebuild portions of the Central Freeway, and shall the City end the ban on construction of new above ground freeway ramps north of Fell Street).

⁽¹⁾ Alternative 8 calls for the freeway to touch down at Octavia and Market.

⁽²⁾ Alternative 3 calls for the freeway to cross above Market Street and touch down at Octavia and Haight. Octavia converted to a boulevard.

⁽³⁾ Retrofit alternative, known as 1B, would rebuild the existing structure including the Fell/Oak ramps.

⁽⁴⁾ Alternative 8/9 calls for the freeway to touch down at Valencia with a new on ramp on Otis Street and an off ramp on South Van Ness.

Alternative 1B

Freeway ends at Fell and Oak Streets



Source: SFCTA Transportation Analysis Database, Caltrans, Dept. of Public Works

Alternative 3B

Freeway ends at Haight Street

4 or 6 lane boulevard



Source: SFCTA Transportation Analysis Database, Caltrans, Dept. of Public Works

Alternative 8B

Freeway ends at Market Street

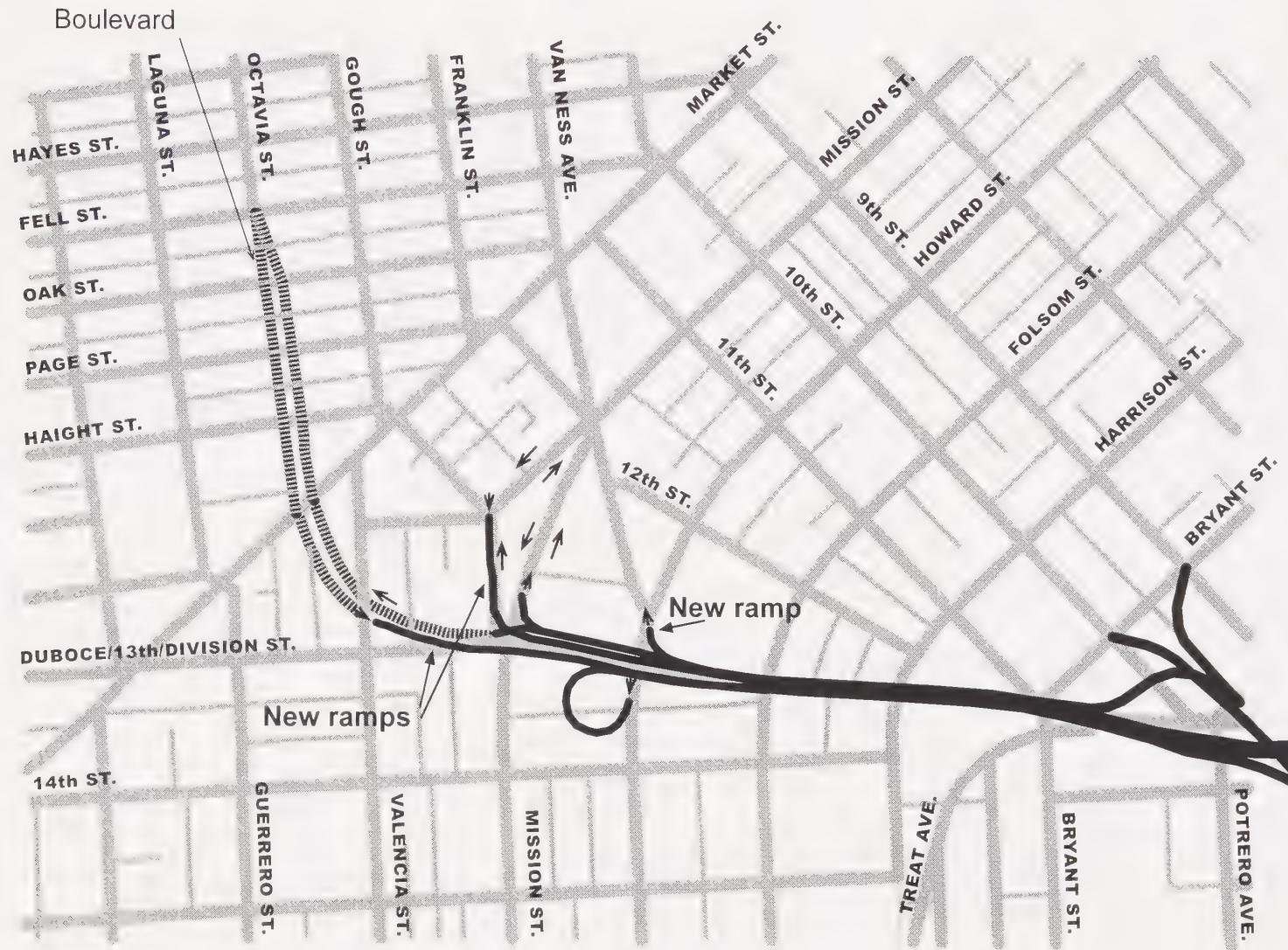
Boulevard



Source: SFCTA Transportation Analysis Database, Caltrans, Dept. of Public Works

Alternative 8/9

Freeway ends South of Market Street



Source: SFCTA Transportation Analysis Database, Caltrans, Dept. of Public Works

Alternative 1B

Traffic Impacts Analysis



Source: SFCTA Transportation Analysis Database, DPT, Caltrans, MUNI, DPW

Alternative 3B

Traffic Impacts Analysis



Source: SFCTA Transportation Analysis Database, DPT, Caltrans, MUNI, DPW



Traffic Impacts Analysis



Source: SFCTA Transportation Analysis Database, DPT, Caltrans, MUNI, DPW

Alternative 8/9

Traffic Impacts Analysis



Source: SFCTA Transportation Analysis Database, DPT, Caltrans, MUNI, DPW



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